

ECE 473
Homework Assignment #8
Due: Friday, November 2, 2018

1. A pulsating sphere of radius $a = 0.1$ m radiates spherical waves into air at a frequency of 660 Hz. (a) If the intensity at a distance of 0.5 m from the center of the spherical source is 20 W/m^2 , then what is the total acoustic power passing through the surface of a sphere of radius 0.5 m centered on the spherical source? (b) At the surface of the sphere, $r = a$, compute the intensity and the amplitudes of the acoustic pressure and particle velocity.
2. Problem 7.1.3 in Kinsler et al. Use water at 20°C .
3. Problem 7.1.5 in Kinsler et al. In part b) plot versus ka .
4. A simple line source is designed so that $kL = 15$. (a) There is a major (main) lobe at $\theta = 0^\circ$. How many minor (side) lobes are there on each side of the major lobe? (b) How many nodal surfaces are there on each side of the major lobe? (c) Find the angular width in degrees of the major lobe. (d) Estimate the relative strength in dB of the first side lobe compared to the main lobe.
5. Problem 7.3.1 in Kinsler et al.